

# PATENT ABSTRACTS OF JAPAN

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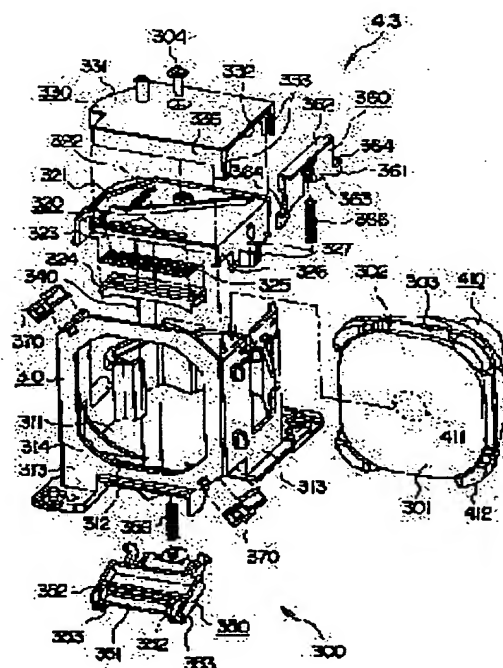
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## ) LIGHT SOURCE DEVICE AND PROJECTOR

### )Abstract:

OBLEM TO BE SOLVED: To provide a light source device by which the time of a light source lamp is prolonged by preventing a burst piece n being dropped outside, even if the light source lamp bursts and also efficiently cooling it.

LUTION: A pair of aperture parts 302, arranged symmetrically by itering the optical axis of a reflector 412, is formed on the abutting face of a transparent plate 301 and the reflector 412, and a housing 300 provided with a cooling passage 340 for guiding cooling air to the light rce lamp 411 through the pair of the aperture parts 302 and a first and ond cooling passage opening/closing parts 350 and 360 for clogging the ling passage 340 at detaching from a projector 1. The light source lamp is cooled efficiently, and the life time of the light source lamp 411 can prolonged. Even though the light-emitting tube of the light source lamp bursts while using the projector 1, the burst piece of the light emitting e will not drop outside at the replacing of the light source device 413, l the cooling efficiency of the light source lamp 411 will not be spoiled.



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## AIMS

aim(s)]

aim 1] The flux of light injected from the light source lamp is modulated according to image information, an optical image is formed, and it is used for the projector which carries out expansion projection of this optical image. A light source lamp, The reflector which arranges and injects the beam of light emitted from this light source lamp, It is light equipment equipped with the case which contains said light source lamp and said reflector. The beam-of-light injection side of said reflector is covered with a transparency plate. In this transparency plate and the contact side of said reflector opening of the pair by which symmetry arrangement is carried out considering the optical axis of said reflector as a core is formed. Said case Light equipment characterized by having the cooling passage which introduces cooling air into said light source lamp through opening of said pair, and the cooling passage closing motion section which opens this cooling passage when this cooling passage is taken up when it removes from said projector, and said projector is equipped.

aim 2] It is light equipment characterized by being the crevice where opening of said pair was formed in a part for beam-of-light injection direction point of said reflector in light equipment according to claim 1.

aim 3] It is light equipment characterized by being arranged horizontally when opening of said pair removes from said projector in claim 1 and light equipment according to claim 2.

aim 4] It is light equipment characterized by having the covering device material which plugs up opening which said sliding passage closing motion section was supported to revolve by said case free [ rotation ] in light equipment according to claim 1 to 3, and was formed in this case, and the energization member which energizes this covering device material in the rotation direction.

aim 5] It is light equipment characterized by having the covering device material which plugs up opening which said sliding passage closing motion section was supported by said case free [ sliding ] in light equipment according to claim 1 to 4, and was formed in this case, and the energization member which energizes this covering device material in the sliding direction.

aim 6] light equipment according to claim 1 to 5 -- setting -- said case -- said cooling passage from the outside of a case -- and/or, the light equipment characterized by forming the duct which guides the air from said cooling passage out of a case.

aim 7] Light equipment characterized by preparing the filter for protection against dust in opening of said pair in light equipment according to claim 1 to 6.

aim 8] The projector characterized by having light equipment according to claim 1 to 7.

aim 9] The projector characterized by having the duct which a tip is inserted in said cooling passage closing motion section, and draws cooling air in this light equipment in a projector according to claim 8 at the time of wearing of said light equipment.

aim 10] The projector characterized by preparing the fan who sends cooling air into the end face side in said duct in a projector according to claim 9.

aim 11] It is the projector to which it has the jet pipe which discharges the air which cooled said interior of light equipment to the equipment exterior in a projector according to claim 9, and said duct is characterized by connecting the end face side with this jet pipe.

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## TAILED DESCRIPTION

### tailed Description of the Invention]

01]

Field of the Invention] This invention modulates the flux of light injected from the light source lamp according to image information, forms an optical image, is used for the projector which carries out expansion projection of this optical image, and relates to light equipment equipped with the case which contains a light source lamp, the reflector which arranges and injects the beam of light emitted from this light source lamp, and said light source lamp and said reflector, and the projector equipped with this light equipment.

02]

Background of the Invention] Conventionally, the flux of light injected from the light source lamp is modulated according to image information, an optical image is formed, and the projector which carries out expansion projection of an optical image is used. Such a projector is widely used for the multimedia presentation in a meeting, a society, a school, etc. For this reason, in order to enable clear-ization of the projection image by the projector, high brightness-ization of a light source lamp is promoted.

03] Here, when a high-pressure mercury lamp and a metal halide lamp are used and it becomes a life as a light source lamp, the arc tube made from quartz glass explodes, and there is a possibility that a fragment may scatter. For this reason, the light equipment containing this light source lamp covered the beam-of-light injection side of a reflector with the transparence glass plate etc., and had given a device to which a fragment does not scatter even if a light source lamp explodes.

04]

Problem(s) to be Solved by the Invention] However, since a light source lamp will be sealed inside the space which consists of a reflector and a transparence glass plate, a light source lamp tends to become an elevated temperature, and the light equipment mentioned above has the problem of contracting the life of a light source lamp on the contrary. Although the structure which forms opening for cooling air installation in some of reflectors and transparence glass plates, and cools an arc tube on the other hand can be considered, if opening is formed, it will become difficult at the time of the burst of a light source lamp to make a fragment into the structure of not failing to fall completely.

05] The purpose of this invention is to offer the light equipment which a fragment cannot fall outside, and can cool efficiently and can attain reinforcement of a light source lamp, and a projector, even if a light source lamp should explode.

06]

Means for Solving the Problem] In order to attain said purpose, the light equipment of this invention The flux of light injected from the light source lamp is modulated according to image information, an optical image is formed, and it is used for the projector which carries out expansion projection of this optical image. A light source lamp, The reflector which arranges and injects the beam of light emitted from this light source lamp, It is light equipment equipped with the case which contains said light source lamp and said reflector, and the beam-of-light injection side of said reflector is covered with a transparence plate. In this transparence plate and the contact side of a reflector Opening of the pair by which symmetry arrangement is carried out considering the optical axis of said reflector as a core is formed. Said case is characterized by having the cooling passage which introduces cooling air into said light source lamp through opening of said pair, and the cooling passage closing motion section which makes this cooling passage open wide when this cooling passage is taken up when it removes from said projector, and said projector is equipped.

07] Here, although some transparence plates can be cut and opening of a pair mentioned above can also lack and in it, it is desirable to constitute a part of beam-of-light injection direction tip edge of a reflector as a crevice which is formed by lacking. It is because cooling air can be further passed near the light source lamp which is a

ice of generation of heat in the direction which goes to the optical axis of a reflector direct and a light source lamp be efficiently cooled in it. Under the present circumstances, being arranged horizontally is desirable when opening pair removes from a projector. Moreover, the case which contains a light source lamp and a reflector can say the which has the positioning side which positions a light source lamp and a reflector in the direction of an optical axis the flux of light injected, and the direction which intersects perpendicularly with this optical axis, for example, can substitute it as mold goods made from plastics by injection molding etc.

08] Since the cooling passage which introduces cooling air into a case through opening of a pair at a light source p is formed according to such this invention, a light source lamp can be cooled efficiently and reinforcement of a t source lamp can be attained. Moreover, since it is constituted so that the fragment of an arc tube may not fall side on the occasion of exchange of light equipment and this cooling passage closing motion section may open ling passage at the time of wearing of a projector even if the arc tube of a light source lamp explodes while using a ector since it has the cooling passage closing motion section which takes up cooling passage when it removes from a ector, the cooling effectiveness of a light source lamp is not spoiled. Furthermore, if it equips with light equipment hat opening of a pair may arrange horizontally when it removes from a projector, it can prevent much more certainly the fragment of an arc tube falls outside on the occasion of exchange of the light equipment concerned.

09] As the cooling passage closing motion section mentioned above The covering device material which plugs up ning which was supported to revolve by the case free [ rotation ] and was formed in this case, The covering device erial which plugs up the thing equipped with the energization member which energizes this covering device material e rotation direction, and opening which was supported by the case free [ sliding ] and was formed in this case, The g equipped with the energization member which energizes this covering device material in the sliding direction can onsidered, opening for air installation, one of openings for air discharge, or both of the cooling passage formed in a e are used together, and it is good also as the cooling passage closing motion section. Thus, since the cooling passage ing motion section can be prepared in a case with simple structure when the cooling passage closing motion section sists of covering device material and an energization member, easy-ization of manufacture of light equipment can be ined.

10] moreover -- the case mentioned above -- the cooling passage from the outside of a case -- and/or, it is desirable the duct which guides the air from cooling passage out of a case is formed. Thus, since discharge of the air after allation of the cooling air from the outside of a case and cooling out of a case can be performed by forming the duct e case in the location according to the cooling passage in a projector, the cooling effectiveness of light equipment be raised further.

11] Furthermore, to opening of a pair mentioned above, it is desirable that the filter for protection against dust is pared. Here, the filter for protection against dust can prepare only opening for air installation in opening for air harge, and both among openings of a pair. Thus, even if the arc tube of a light source lamp should explode by paring the filter for protection against dust, a fragment can prevent falling out of a case certainly. Moreover, if a ection-against-dust filter is prepared in opening for air installation, since it can prevent that dust invades in light ipment with installation of cooling air, the fall of the brightness accompanying the dirt of an arc tube can be vented.

12] And the projector of this invention is characterized by having either of the light equipment mentioned above, and ording to such a projector, it can enjoy the same operation and effectiveness as the above.

13] In the above-mentioned projector, it is desirable at the time of wearing of light equipment to have the duct which p is inserted in the cooling passage closing motion section, and draws cooling air in the light equipment concerned. ce the cooling air in a projector can be certainly drawn in light equipment by having such a duct, the cooling ctiveness of light equipment can improve further and can lengthen the life of light equipment further.

14] Moreover, when it has the jet pipe which discharges the air to which the fan who sends cooling air into the end e side is prepared in the duct mentioned above, or the projector cooled the interior of equipment to the equipment erior, as for the duct mentioned above, it is desirable that the end face side is connected with the jet pipe. Thus, since ling air is compulsorily sendable into cooling passage from a duct by preparing the fan in the duct or connecting h a jet pipe, circulation of cooling air can be promoted and the cooling effectiveness of light equipment can be roved further.

15] [Embodiment of the Invention] The gestalt of operation of this invention is explained based on a drawing below.  
 [main configurations of 1. projector] The whole perspective view as which the whole perspective view which ked at the projector 1 which drawing 1 requires for this operation gestalt from the upper part, drawing 2 , and 3 arded the projector 1 from the lower part, and drawing 4 are the perspective views showing the interior of a projector

a projector 1 the flux of light injected from the light equipment as the light source Red (R), Separate into the three primary colors of green (G) and blue (B), make each of these colored light bundles correspond to image information through the liquid crystal panel which is light modulation equipment which constitutes an electro-optic device, and it comes irregular. It is the thing of the format which compounds the modulation flux of light of each color after coming irregular with the cross dichroic prism 45, and carries out an enlarged display on a projection side through the projection lens 46. Although each component part is contained inside the sheathing case 2, the projection lens 46 is needed possible [ a protrusion ] from the sheathing case 2 according to the zoom device if needed.

16] In drawing 1 thru/or drawing 4 , a projector 1 is equipped with the sheathing case 2 which is a case, the power supply unit 3 held in the sheathing case 2, and the optical unit 4 of the flat-surface L typeface similarly arranged in the sheathing case 2, and serves as a whole abbreviation rectangular parallelepiped configuration.

17] Fundamentally, infixation arrangement of the equipment top face is carried out between the upper case 21 made from a wrap sheet metal, the lower case 23 made from dies casting, such as magnesium which constitutes an equipment case, and an upper case 21 and the lower case 23, and the sheathing case 2 consists of middle cases 22 which carried out bending of wrap aluminum or the griddle in the equipment side face. These cases 21, 22, and 23 of each other are being fixed with the screw.

18] An upper case 21 is formed by the lateral portion 212 prepared in the top-face section 211 and its perimeter, for example, fabrication is carried out with a press etc. using metal mold. Moreover, round hole opening 211D corresponding to the lens mounting rim 24 which attaches the projection lens 46 is prepared in the front section 211A of a lateral portion 212, and the circumference of round hole opening 211D is curving to the interior side by bending. Furthermore, notch 211C (refer to drawing 3 ) is formed in one side face which intersects perpendicularly with front section 211A of a lateral portion 212. Moreover, actuation switch 2B for adjusting the image quality of a projector is prepared in the projection lens 46 side of the top-face section 211 of an upper case 21. Much hole 2C for speakers is drilled by the method of both sides of this actuation switch 2B.

19] 1st case member 22A which the middle case 22 carries out bending of the aluminum plate etc. as mentioned above, is fabricated, and is arranged on both sides of the projection lens 46 at right and left, and 2nd case member 22B, is formed including 3rd case member 22C by the side of the tooth back of 1st case member 22A. Between 1st case member 22A and 3rd case member 22C Interface exposure member 22D to which the various connectors for an interface prepared in the interface substrate 92 arranged inside are exposed is arranged and connected. Between 2nd case member 22B and 3rd case member 22C, lamp cover 22E is prepared possible [ closing motion ].

20] Each case members 22A, 22B, and 22C are carrying out bending of the aluminum plate of the predetermined configuration pierced in the press, the machining center, etc. suitably, and are made into the configuration combined with said upper case 21 and the lower case 23.

21] Between front 221A formed in the front-face side of 1st case member 22A, and 2nd case member 22B, opening (\*\*\*) corresponding to said lens mounting rim 24 is formed. Moreover, opening which is not illustrated is formed in front 221A side of 2nd case member 22B, and this opening has countered with exhaust-port 24A currently formed in lens mounting rim 24.

22] And this lens mounting rim 24 constitutes the middle case 22 concerned by being attached in the middle case 22. In addition, the covering 240 made from plastics is stuck on the perimeter of exhaust-port 24A. Moreover, the handle 80 of a predetermined dimension stretch and each use in case opening 221B for predetermined dimension \*\*\*\*\* handles is prepared and carries a projector 1 to these openings 221B toward the lower case 23 side to an upper case 21 is attached in 2nd case member 22B.

23] Lamp cover 22E is engaging with the edge of 3rd case member 22C while having the tongue members 81, such as \*\*\*\*, in the 2nd case member 22B side as shown in drawing 3 for example. This tongue member 81 is screwed in the which is formed in 2nd case member 22B through the ring E and which is not illustrated. If it turns tongue member and screwing with a nut is canceled, the tongue member 81 will jump out only of a part to have screwed outside lamp cover 22E. And if this tongue member 81 is held and lamp cover 22E is made to slide along the side face of a projector the lamp cover 22E concerned can be removed. In addition, since the tongue member 81 is supported in the ring E, even if it cancels screwing with a nut, it has structure from which it does not separate from lamp cover 22E.

24] The lower case 23 is made into products made from dies casting, such as magnesium, as mentioned above, and abbreviation rectangle-like bottom surface part 231 and the lateral portion 232 of the perimeter are really formed. A reinforcing rib etc. is suitably prepared in a predetermined part, and the reinforcement of the lower case 23 whole is carried out in the interior.

25] In such a lower case 23, the height justification device 7 in which adjust the inclination of the projector 1 whole alignment of a projection image is performed is formed in a part for both the corners ahead of the bottom surface

231. On the other hand, the foot member 6 ( drawing 3 ) made of resin has fitted into the back side center section of bottom surface part 231. In addition, the height justification device 7 can change the height and inclination of the play screen by rotating a dial part, or being the configuration of moving in the protrusion direction by operating a lever, and adjusting the amount of attitudes. Moreover, the fan cover 235 is attached in the bottom surface part 231 of lower case 23. Furthermore, corresponding to the lens mounting rim 24, round hole opening 232D is prepared in that section 232A of the lower case 23.

26] Exhaust-port 24A for discharging the air after inhalation-of-air hole 2A for taking in cooling air and cooling, rotation switch 2B, hole 2C of a large number corresponding to the location of a loudspeaker, opening 221 for handles etc. are prepared in the interior at such a sheathing case 2. In addition, also from opening 221 for handles B, as shown in drawing 2 , inhalation-of-air hole 221F are formed so that cooling air may be taken in inside.

27] The power supply unit 3 consists of lamp drive circuits 101 arranged above the power source which has been arranged at the inferior-surface-of-tongue side within the sheathing case 2, and which is not illustrated, and a power source, as shown in drawing 4 . A power source supplies the power supplied through the power cable to the lamp drive unit 101, the driver board which is not illustrated, and is equipped with the inlet connector 33 ( drawing 4 ) in which a power cable is inserted.

28] The lamp drive circuit 101 supplies power to the light source lamp 411 ( drawing 5 ) which is the light source of optical unit 4. Moreover, the axial flow inhalation-of-air fan 70 which is a cooling fan which adopts air is formed in projector 1 interior mentioned later at the front-face side of equipment of this lamp drive circuit 101. As shown in drawing 5 , the optical unit 4 is a unit which processes optically the flux of light injected from the light source lamp 411, and forms the optical image corresponding to image information, and is equipped with the integrator illumination-light study system 41, the color separation optical system 42, the relay optical system 43, the electro-optic device 44, the dichroic prism 45 as color composition optical system, and the projection lens 46 as projection optical system.

29] [Detailed configuration of 2. optical system] In drawing 5 the integrator illumination-light study system 41 is an optical system for illuminating mostly the image formation field of the liquid crystal panel 441 (it is indicated as liquid crystal panels 441R, 441G, and 441B for every colored light of red, green, and blue, respectively) of three sheets which constitutes an electro-optic device 44 to homogeneity. Light equipment 413, It has UV filter 418, the 1st lens array 414 as a flux of light division component, the 2nd lens array 416, the polarization sensing element 415, the superposition lens 419, and the reflective mirror 424.

30] The light equipment 413 which constitutes the integrator illumination-light study system 41 has the light source lamp 411 as the radiation light source which injects the beam of light of a radial, and the reflector 412 which reflects the electron orbital radiation injected from this light source lamp 411. As a light source lamp 411, a halogen lamp, a metal halide lamp, or a high-pressure mercury lamp is used in many cases. As a reflector 412, although a parabolic mirror is used, an ellipsoid mirror and an parallel-ized lens (concave lens) may be used.

31] The 1st lens array 414 has the configuration with which small lens 414A which sees from an optical axis and has rectangle-like profile mostly was arranged in the shape of a matrix. Each smallness lens 414A is dividing into two or more partial flux of lights the flux of light which is injected from the light source lamp 411 and passes along UV filter 418. The profile configuration of each smallness lens 414A is set up so that an analog may be mostly made with the configuration of the image formation field of a liquid crystal panel 441. For example, if the aspect ratio (ratio of the dimension of width and length) of the image formation field of a liquid crystal panel 441 is 4:3, the aspect ratio of each smallness lens 414A will also be set as 4:3.

32] The 2nd lens array 416 has the almost same configuration as the 1st lens array 414, and has the configuration in which small lens 416A was arranged in the shape of a matrix. This 2nd lens array 416 has the function to which image formation of the image of each smallness lens 414A of the 1st lens array 414 is carried out on a liquid crystal panel 441 with the superposition lens 419.

33] While the polarization sensing element 415 is arranged between the 2nd lens array 416 and the superposition lens 419, the light from the 2nd lens array 416 is changed into one kind of polarization light, and, thereby, the use effectiveness of the light in an electro-optic device 44 is raised.

34] Concretely, it is mostly superimposed on each partial light changed into one kind of polarization light by the polarization sensing element 415 with the superposition lens 419 on the liquid crystal panels 441R and 441G of an electro-optic device 44, and 441B. the light from the light source lamp 411 which emits a random polarization light of several types in the projector 1 (electro-optic device 44) of this operation gestalt using the liquid crystal panel 441 of the type which modulates polarization light since only one kind of polarization light can be used -- one half is not used fully.

35] Then, by using the polarization sensing element 415, all the injection light from the light source lamp 411 is



nged into one kind of polarization light, and the use effectiveness of the light in an electro-optic device 44 is raised. In addition, such a polarization sensing element 415 is introduced to JP,8-304739,A etc.

36] The color separation optical system 42 is equipped with two dichroic mirrors 421,422 and the reflective mirrors 423, and has the function to divide into the colored light of three colors of red, green, and blue two or more partial flux lights injected from the integrator illumination-light study system 41 by mirrors 421 and 422.

37] The relay optical system 43 is equipped with the incidence side lens 431, a relay lens 433, and the reflective mirrors 432 and 434, and has the function to draw blue glow to liquid crystal panel 441B among the colored light generated by the color separation optical system 42.

38] Under the present circumstances, in the dichroic mirror 421 of the color separation optical system 42, while the blue glow component and green light component of the flux of light which were injected from the integrator illumination-light study system 41 reflect, the amount of red light penetrates. It reflects by the reflective mirror 423 and the red light penetrated with the dichroic mirror 421 reaches liquid crystal panel 441R for red through the field lens 417. This field lens 417 changes into the parallel flux of light each partial flux of light injected from the 2nd lens array 416 to that medial axis (chief ray). The same is said of the field lens 417 prepared in front of other liquid crystal panels 441G and 441B. Among the blue glow and green light which were reflected with the dichroic mirror 421, it reflects with the dichroic mirror 422 and green light amounts to liquid crystal panel 441G for green through the field lens 417. On the other hand, blue glow penetrates a dichroic mirror 422, passes along the relay optical system 43, and reaches liquid crystal panel 441B for blue glow through the field lens 417 further. In addition, since the optical-path-length halfbeak of each colored light also has the long die length of the optical path of blue glow, the relay optical system 43 is used for the blue glow for preventing decline in the use effectiveness of the light by diffusion of light etc. That is, it is for telling the partial flux of light which carried out incidence to the incidence side lens 431 to the field lens 417 as it is.

39] An electro-optic device 44 is equipped with the liquid crystal panels 441R, 441G, and 441B used as the light modulation equipment of three sheets, with the liquid crystal panels 441R, 441G, and 441B of these three sheets, according to image information, it becomes irregular, and each colored light from which these were separated by the color separation optical system 42, using poly-Si TFT as a switching element forms an optical image.

40] The cross dichroic prism 45 compounds the image which was injected from the liquid crystal panels 441R, 441G, and 441B of three sheets and which was modulated for every colored light, and forms a color picture. In addition, dielectric multilayers which reflect red light, and the dielectric multilayers which reflect blue glow are formed in prism 45 in the shape of an abbreviation X character in accordance with the interface of four rectangular prisms, and each colored light is compounded by these dielectric multilayers. And the color picture compounded by prism 45 is projected from the projection lens 46, and expansion projection is carried out on a screen.

41] As shown in drawing 4 and drawing 6, each optical system 41-45 explained above is arranged under the main board 90 on which the shielding plate 91 was put, and is held in the light guide 47 as a case for optics made of synthetic resin (drawing 6). namely, -- this light guide 47 -- light equipment 413 -- the above-mentioned besides the wrap light source protection section 471 -- each -- the slot which inserts optic 414-419,421-424,431-434 in a slide type from the upper part is prepared, respectively.

42] Moreover, the head section 49 is formed in the irradiation appearance side of a light guide 47. The prism 45 with which liquid crystal panels 441R, 441G, and 441B were attached in the end side of the head section 49 is fixed, and the projection lens 46 is being fixed on the flange in alignment with a part for the semicircle tubed part by the side of the other end.

43] [Structure of 3. light equipment] As shown in drawing 7 and drawing 8, the above-mentioned light equipment 413 is equipped with the body 410 of a lamp, and the case 300 which contains this body 410 of a lamp, and is constituted by the light source protection section 471 of a projector 1 removable.

44] The body 410 of a lamp is equipped with the light source lamp 411 and the reflector 412 which arranges and projects the beam of light emitted from this light source lamp 411, and is constituted. The beam-of-light injection side of the reflector 412 is covered with the transparence plates 301, such as a glass plate, and the opening 302 of the pair by which symmetry arrangement is carried out as a core is formed in this transparence plate 301 and the contact side of a reflector 412 in the optical axis of the reflector 412 concerned. The opening 302 of this pair consists of crevices 303 formed in a part for the beam-of-light injection direction point of a reflector 412, respectively. Moreover, the filter for protection against dust is prepared in the opening 302 of a pair, respectively (illustration abbreviation). It is possible for the cooling passage 340 to be formed in the body 410 of a lamp, and to cool the light source lamp 411 by this.

45] The body 310 of a case with which a case 300 has the positioning side which positions the light source lamp 411 and a reflector 412 in the direction of an optical axis of the flux of light injected, and the direction which intersects perpendicularly with this optical axis, and opening of the part was carried out, The 1st covering device material 320 and

2nd covering device material 330 which plug up opening of this body 310 of a case, The cooling passage 340 which introduces cooling air into the light source lamp 411 through the opening 302 of a pair, and when it removes from a projector 1 When this cooling passage 340 is taken up and a projector 1 is equipped, it has the 1st cooling passage closing motion section 350 and the 2nd cooling passage closing motion section 360 which open this cooling passage, and is constituted.

46] The body 310 of a case contains the body 410 of a lamp, is equipped with the bottom surface part 311 in which body 410 of a lamp concerned is laid, and the lateral portion 313 which started perpendicularly and was formed from periphery of this bottom surface part 311, and is formed in the shape of a cross-section abbreviation KO typeface. An opening 314 which the above-mentioned transparency plate 301 exposes is formed in a part of lateral portion 313. When the body 410 of a lamp is contained on this body 310 of a case, the lateral portion 313 in which opening 314 was formed is contacted in the periphery of a reflector 412, and the body 410 of a lamp is fixed to the body 310 of a case by clamping the periphery and lateral portion 313 of the reflector 412 concerned with a clip 370 from an outside. The opening 312 which opens the inside and outside of body of case 310 for free passage is formed in the location according to the location in which the 1st cooling passage closing motion section 350 which the bottom surface part 311 mentions is attached.

47] The 1st covering device material 320 plugs up opening of the body 310 of a case directly, is equipped with the extension section 326 which extends toward the body 310 of a case from the edge of the bottom surface part 311, the covering device body 321 attached in the side which counters, and this covering device body 321, and is constituted in the shape of a cross-section abbreviation KO typeface. The covering device body 321 is formed in flat-surface abbreviation trapezoidal shape, and the prismatic form guide plate 322 for showing cooling air to the top face is set up. Moreover, the square-like opening 323 is formed near the 1 side edge by the side of before [ of the covering device body 321 ] the drawing 8 metacarpus. and the location corresponding to this opening 323 in the rear face of the covering device body 321 -- the opening 323 concerned and abbreviation -- the frame part material 324 which has opening of the same magnitude is formed. The mesh-like filter 325 is infixed between this frame part material 324 and the covering device body 321. The crevice 327 which has opening toward the upper part is formed in the side-face central part of the extension section 326 by the side of drawing 8 Nakamigi between the two extension sections 326.

48] The 2nd covering device material 330 is a wrap thing about the 1st covering device material 320, it is equipped with the extension section 336 which extends the covering device body 321 of the 1st covering device material 320 concerned toward the covering device body 321 with the wrap covering section 331, is constituted, is \*\*\*\*ed to the 1st covering device material 320, and is being fixed by 304. Moreover, the side-face part which counters the crevice 327 of the 2nd covering device material 330 is formed in the shape of a KO typeface, and serves as the crevice 332 which went ahead and was dented, and the slot 333 is formed in the side face in which this inner skin counters. Here, when the 2nd covering device material 330 is put on the 1st covering device material 320, the crevice 332 is set up so that it may come opening. When this 2nd covering device material 330 is attached in the 1st covering device material 320, it is held in the condition of having floated up by the height dimension of a guide plate 322. That is, a clearance is formed between the 1st covering device material 320 and the 2nd covering device material 330. It is possible for this to perform exchange with the air of the cooling passage 340 in a case 300 and the air besides a case 300 by the clearance. Therefore, this clearance -- the cooling passage 340 from the outside of a case 300 -- and/or, it is the duct which guides air from the cooling passage 340 out of a case 300.

49] The 1st cooling passage closing motion section 350 was supported to revolve free [ rotation ] by the body 310 of a case, and is equipped with the coiled spring 356 which is the covering device material 351 which plugs up the opening 312 formed in the body 310 of a case concerned, and the energization member which energizes this covering device material 351 in the rotation direction. While the covering device material 351 is formed in box-like, near [ the ] the faces on both sides, the claw part 352 of the pair projected to the body 310 side of a case is formed. And between this claw part 352 and side face, the crevice 353 where the 1st height 475 mentioned later is inserted is formed. Therefore, if crevice 353 is pushed in the body 310 of a case, and the direction to estrange as shown in drawing 9 for example, the covering device material 351 will open, and cooling air will be introduced or discharged by opening 312. On the other hand, if a hand is lifted from the crevice 353 which was being pushed, the covering device material 351 will plug up opening 312 with the energization force of coiled spring 356 automatically.

50] The 2nd cooling passage closing motion section 360 was supported free [ sliding ] by the body 310 of a case, and is equipped with the coiled spring 366 which is the covering device material 361 which plugs up opening formed in the crevice 332 of the 2nd covering device material 330, and the energization member which energizes this covering device material 361 in the sliding direction. The covering device material 361 is equipped with the tabular contact section 362 which contacts a part for the horizontal level of said crevice 332, the sliding section 363 which has the edge by which



ng is carried out to said slot 333, intersects perpendicularly, is prepared in the rear face of the contact section 362, slides in accordance with the body 310 of a case, and the claw part 364 which contacts at the tip of the extension 336, and is formed the cross-section abbreviation configuration for T characters and, and in the shape of a transverse-plane abbreviation square. An end is attached in the covering device material 361, and, as for coiled spring 366, insertion immobilization is carried out in the crevice 327 where the other end is formed in the extension section 336 of the 1st covering device material 320. Therefore, if a claw part 364 is pushed toward the body 310 side of a case shown in drawing 9 for example, the covering device material 361 will open, opening between the 1st covering device material 320 and the 2nd covering device material 330 will appear, and cooling air will be discharged or introduced. On the other hand, if a hand is lifted from the claw part 364 which was being pushed, the covering device material 361 will plug up opening with the energization force of coiled spring 366 automatically.

51] Such light equipment 413 is removable in the light source protection section 471, as shown in drawing 10. This light source protection section 471 has the stowage 472 of the shape of light equipment 413 and abbreviation isomorphism inside, and the projection lens 46 side is formed in box-like [ to which opening of the field of the opposite side was carried out ]. Here, in drawing 10, light equipment 413 is in the condition which has arranged the opening 314 of the body 310 of a case to the right lateral, and is contained by the stowage 472 from the 2nd covering device material 330. That is, the bottom surface part 311 of the body 310 of a case serves as a field exposed outside. Moreover, the opening 302 of the pair formed in the body 410 of a lamp is horizontally arranged by containing light equipment 413 in the condition of having arranged the opening 314 of the body 310 of a case to the right lateral, and removing it in this condition.

52] When light equipment 413 is inserted in a stowage 472, the 1st height 475 of the pair which is inserted in the crevice 353 of the 1st cooling passage closing motion section 350, and pushes up the crevice 353 concerned is formed in the opening periphery of a light guide 47. Moreover, when light equipment 413 is inserted in a stowage 472, the 2nd height 476 of the pair which contacts the claw part 364 of the 2nd cooling passage closing motion section 360, and pushes up the claw part 364 concerned, and the opening 477 which leads to inhalation opening of the sirocco fan which is a centrifugal-force fan who is stationed down the base 473, and who does not illustrate are formed in the base 473 of a stowage 472. When opening 477 contains light equipment 413 to a stowage 472, it has countered opening between the covering device material 320 and the 2nd covering device material 330. Moreover, the opening 474 currently formed in the near side of this opening 477 is opening into which the air of the periphery of light equipment 413 flows, and can incorporate the air of quite low temperature as compared with the temperature inside a reflector 412.

53] therefore, in case the 1st cooling passage closing motion section 350 contains light equipment 413 to a stowage 472 (the projector 1 was equipped) As shown in drawing 11 (A), the 1st height 475 opens automatically. The cooling passage 340 in a case 300 is opened wide, and conversely, in case light equipment 413 is removed from a stowage 472 (removed from the projector 1), as shown in drawing 11 (B), the energization force of coiled spring 356 closes the cooling passage 340 automatically. Similarly, in case the 2nd cooling passage closing motion section 360 contains light equipment 413 to a stowage 472 (the projector 1 was equipped) As shown in drawing 12 (A), the 2nd height 476 opens automatically. The cooling passage 340 in a case 300 is opened wide, and conversely, in case light equipment 413 is removed from a stowage 472 (it removed from the projector 1), as shown in drawing 12 (B), the energization force of coiled spring 366 closes the cooling passage 340 automatically.

54] On the other hand, as shown in drawing 13, the tip was inserted in the light equipment 413 with which the stowage 472 was equipped at the 1st cooling passage closing motion section 350, and the projector 1 is equipped with a duct 381 of the shape of a rectangular pipe which draws cooling air in the light equipment 413 concerned. Moreover, the cooling fan 382 which is a centrifugal-force fan who sends in cooling air is formed in the end face side (the 1st cooling passage closing motion section 350 side is the opposite side) of this duct 381. Therefore, the cooling air in the light equipment 413 with which the cooling fan 382 and duct 381 in this operation gestalt were prepared flows the cooling passage 340 in the direction which goes to the 2nd cooling passage closing motion section 360 from the 1st cooling passage closing motion section 350. That is, the opening 312 of the body 310 of a case turns into opening for air inhalation, and opening opened and closed in the 2nd cooling passage closing motion section 360 is opening for air discharge. It is possible for this to lead certainly the cooling air taken in for example, in the projector 1 from the above-mentioned inhalation-of-air hole 2A, opening 221 for handles B, etc. to the light source lamp 411 in light equipment 413. And the air which cooled the inside of light equipment 413 passes along the opening 474 formed in the base 473 of a stowage 472, and with a sirocco fan, the inhalation of air of it is carried out, and it is discharged besides a projector 1 through the jet pipe 390 connected to the sirocco fan concerned.

55] According to such this operation gestalt, the following effectiveness is acquired. Namely, since it constituted in a crevice 303 which cuts a part of beam-of-light injection direction tip edge of a reflector 412, and lacks and forms

opening 302 of a pair, in the direction which goes to the optical axis of a reflector 412 direct, cooling air can be passed on about 411 light source lamp which is a source of generation of heat, and, thereby, the light source lamp 411 can be cooled efficiently.

56] Moreover, since the cooling passage 340 which introduces cooling air into a case 300 through the opening 302 of air at the light source lamp 411 was formed, the light source lamp 411 can be cooled efficiently and reinforcement of light source lamp 411 concerned can be attained. Furthermore, since it has the 1st and 2 cooling passage closing motion sections 350 and 360 which take up the cooling passage 340 when it removes from a projector 1, Even if the arc of the light source lamp 411 explodes while using a projector 1, on the occasion of exchange of light equipment, the fragment of an arc tube does not fall outside. At the time of wearing of a projector 1 Since it is constituted so these 1st and 2 cooling passage closing motion sections 350 and 360 may open the cooling passage 340, the cooling effectiveness of the light source lamp 411 is not spoiled. Furthermore, since it equipped with light equipment 413 so that opening 302 of a pair might arrange horizontally when it removed from a projector 1, it can prevent much more mainly that the fragment of the arc tube of light source random \*\* 411 falls outside on the occasion of exchange of the light equipment 413 concerned.

57] Moreover, since the 1st and 2 cooling passage closing motion sections 350 and 360 were constituted from spring device material 351 and 361 and coiled spring 356 and 366, respectively, the cooling passage 340 closing-motion section can be prepared in a case 300 with simple structure, and, thereby, easy-ization of manufacture of light equipment 413 can be attained.

58] Furthermore, since the duct was formed between the 1st covering device material 320 and the 2nd covering device material 330, discharge of the air after installation of the cooling air from the outside of a case 300 and cooling of a case 300 can be performed in the location according to the cooling passage 340 in a projector 1, and the cooling effectiveness of light equipment 413 can be raised further.

59] Moreover, since the filter for protection against dust was prepared in the opening 302 of a pair, respectively, even if the arc tube of the light source lamp 411 should explode, a fragment can prevent falling out of a case 300 mainly. Moreover, since the protection-against-dust filter was prepared in the opening 302 for air installation, it can prevent that dust invades in light equipment 413 with installation of cooling air, and the fall of the brightness accompanying the dirt of an arc tube can be prevented.

50] Furthermore, in the projector 1 equipped with light equipment 413, since it had the duct 381 which leads cooling air to the light equipment 413 concerned, the cooling air in a projector 1 can be certainly drawn in light equipment 413, cooling effectiveness of light equipment 413 can improve further, and the life of light equipment 413 can be strengthened further.

61] Moreover, since the cooling fan 382 was formed in the duct 381, cooling air can be compulsorily sent into the cooling passage 340 from the duct 381 concerned, circulation of cooling air can be promoted, and the cooling effectiveness of light equipment 413 can be improved further.

62] In addition, this invention is not limited to the gestalt of said operation, and deformation as shown below etc. is included in this invention including other configurations which can attain the purpose of this invention. For example, in said operation gestalt, although the cooling fan was formed, as shown in drawing 14, a hole may be opened in the jet pipes 390, and not only this but the jet pipe 383 which discharges the air which cooled the interior of light equipment to this hole to the equipment exterior may be connected. In this case, the air of the reflector exterior of quite low temperature as the air inside a reflector is mixed, and since it is lower than the temperature inside a reflector, the air in a jet pipe 390 can acquire sufficient cooling effect.

63] Moreover, although cooling air was compulsorily sent into the cooling passage 340 from the duct and the air which carried out inhalation of air with the cooling fan was discharged to the projector exterior with the sirocco fan with said operation gestalt, cooling air is compulsorily sent into the cooling passage 340, and you may make it discharge the air which carried out inhalation of air not only with this but with the sirocco fan to the projector exterior with a cooling fan. If it does in this way, cooling air will be set up so that the cooling passage 340 may be flowed in the direction which is to the 1st cooling passage closing motion section 360 from the 2nd cooling passage closing motion section 350.

64] Furthermore, although it had the duct with said operation gestalt, as long as it is possible to draw cooling air in light equipment enough by opening opened and closed not only in this but in the 1st cooling passage closing motion section 350, you may not be.

65] Moreover, with said operation gestalt, although the filter for protection against dust was prepared in each of the opening of a pair, it may prepare only opening for air installation only in opening for air discharge among openings of only this but a pair.

66] Furthermore, although the duct was formed with said operation gestalt between the 1st covering device material

and the 2nd covering device material 330, as long as it can discharge air not only this but after installation of the .  
ing air from the outside of a case 300, and cooling for example, out of a case 300 efficiently, you may not be.  
67] Moreover, what is necessary is for there to be no coiled spring and just to opt for the configuration and a  
figuration suitably in operation with said operation gestalt, if it enables it to perform closing motion of for example,  
only this but covering device material by the light source protection section side although the 1st and 2 cooling  
age closing motion section was equipped with covering device material and coiled spring.  
68] Furthermore, what is necessary is to use only not only this but the 1st cooling passage closing motion section  
, to use only the 2nd cooling passage closing motion section 360, and just to choose suitably by the configuration of  
light source protection section, and the configuration with said operation gestalt, although two kinds of cooling  
age closing motion sections were used.  
69] Moreover, although opening of a pair arranges horizontally with said operation gestalt when it removes from a  
ector, you may make it arrange not only to this but to a perpendicular direction.  
70] Furthermore, although constituted from said operation gestalt in the crevice 303 which cuts a part of beam-of-  
t injection direction tip edge of a reflector 412, and lacks and forms opening of a pair, for example, not only this but  
ie of transparence plates may be turned off, and it may be lacked and formed.  
71] As a projector of this invention, for example, what [ not only ] used the liquid crystal panel as light modulation  
ipment but a plasma component, the thing equipped with the light modulation equipment using a micro mirror, the  
g equipped with the light modulation equipment of the reflective mold which modulates and carries out outgoing  
ation, reflecting the light which carried out incidence, and a thing a veneer type, a two-sheet type, and rear type are  
loyable. What is necessary is to, modulate the flux of light injected from the light source lamp in short according to  
ge information, to form an optical image, and just to opt for this configuration etc. suitably in operation, if it is the  
ector which carries out expansion projection of this optical image.  
72]  
[ect of the Invention] As stated above, even if a light source lamp should explode, according to the light equipment  
the projector of this invention, it is effective in the ability for a fragment not to fall outside, and cool efficiently and  
in reinforcement of a light source lamp.

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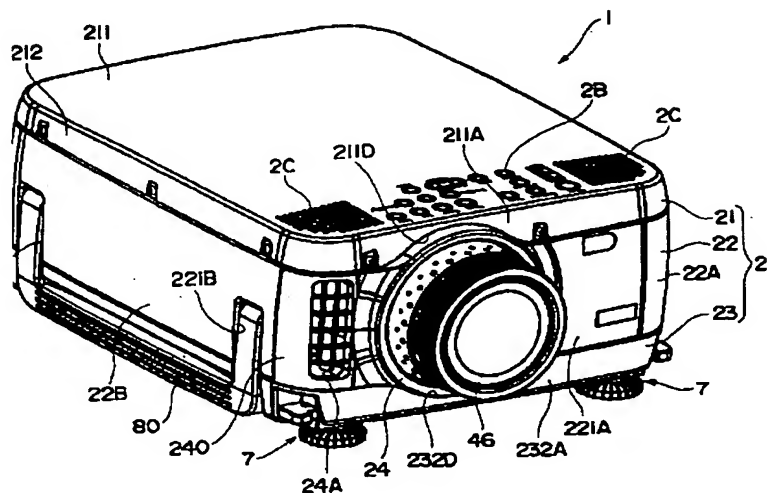
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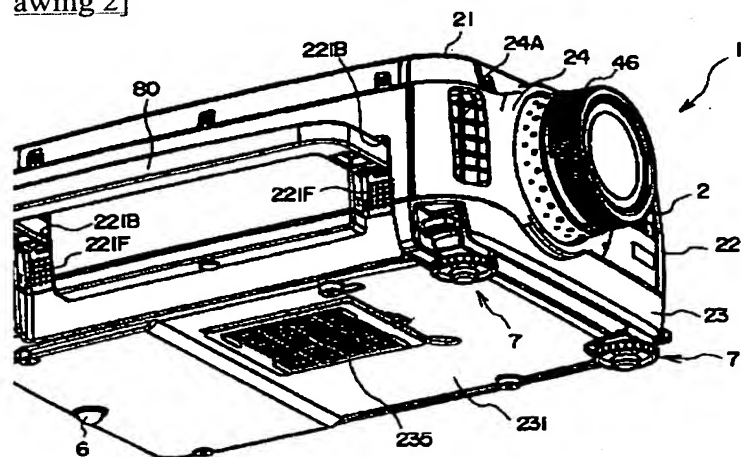
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## AWINGS

awing 1]



awing 2]



awing 11]

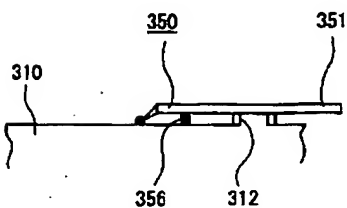
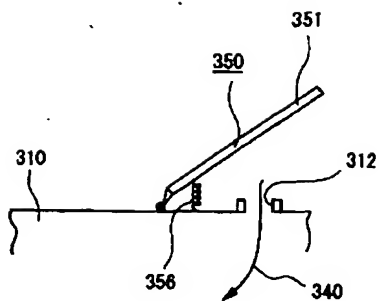


Figure 3]

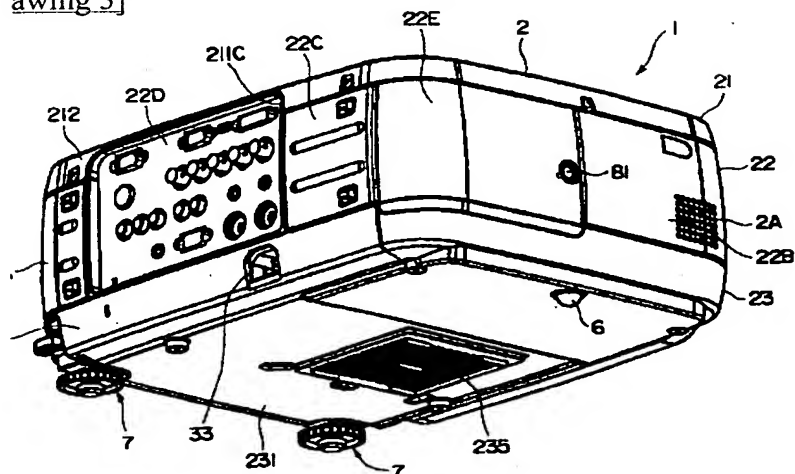


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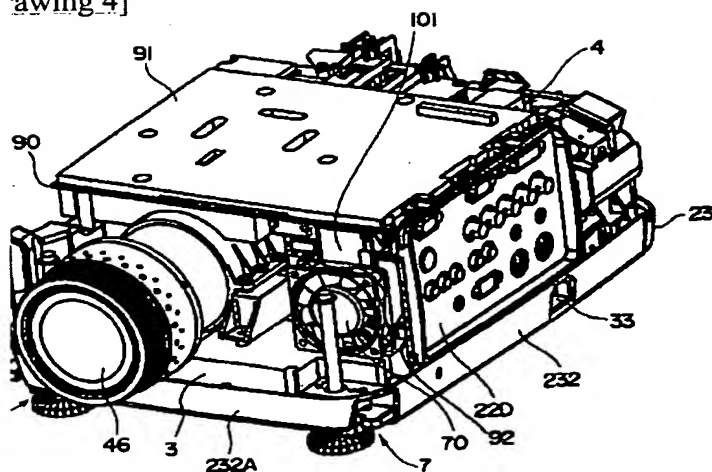


Figure 5]



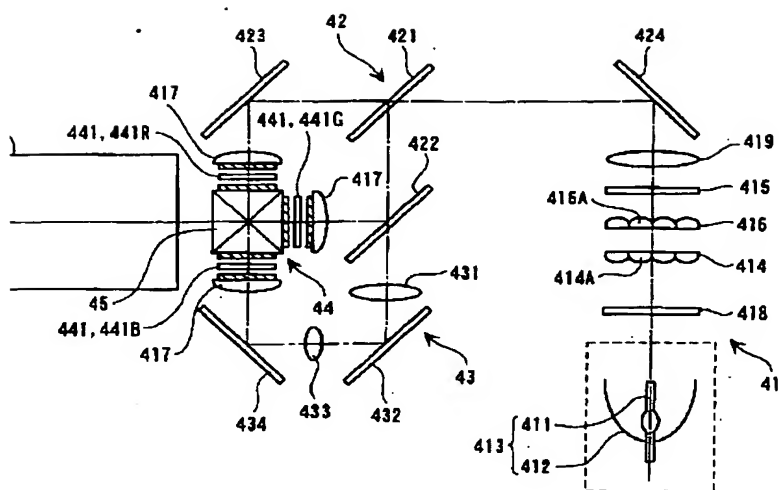


Figure 12]

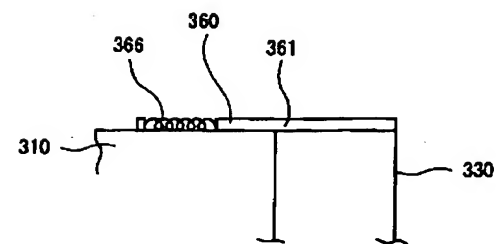
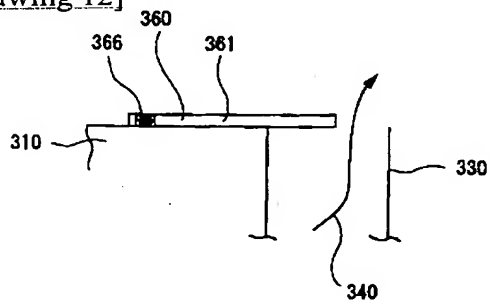


Figure 6]

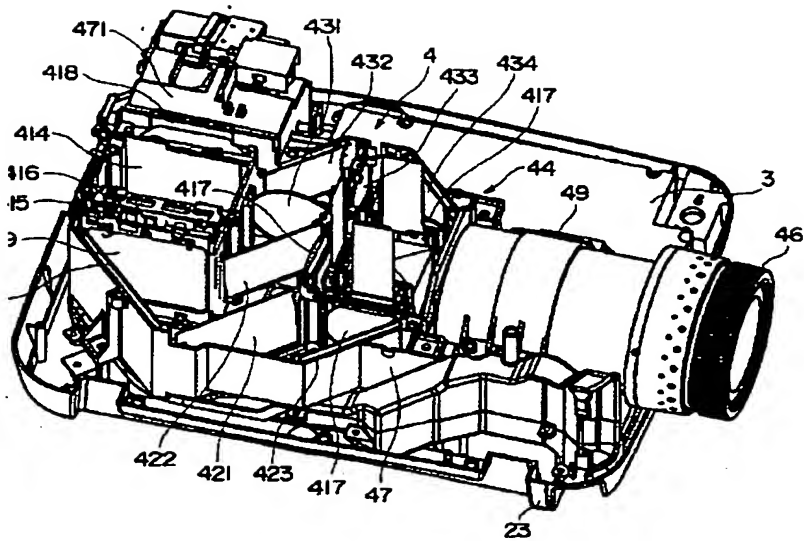


Figure 7]

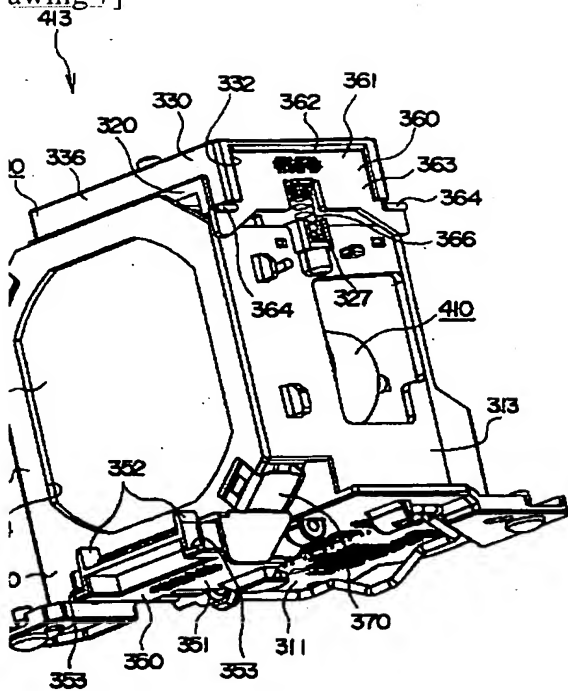
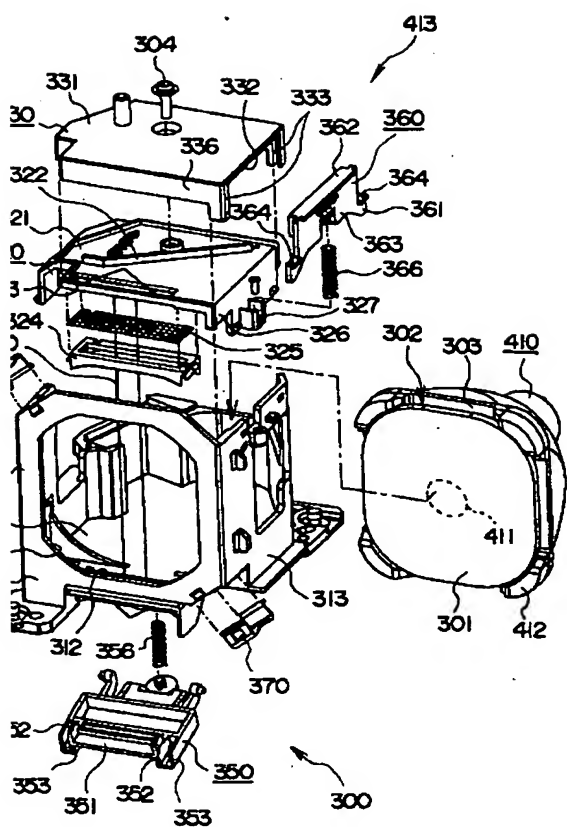
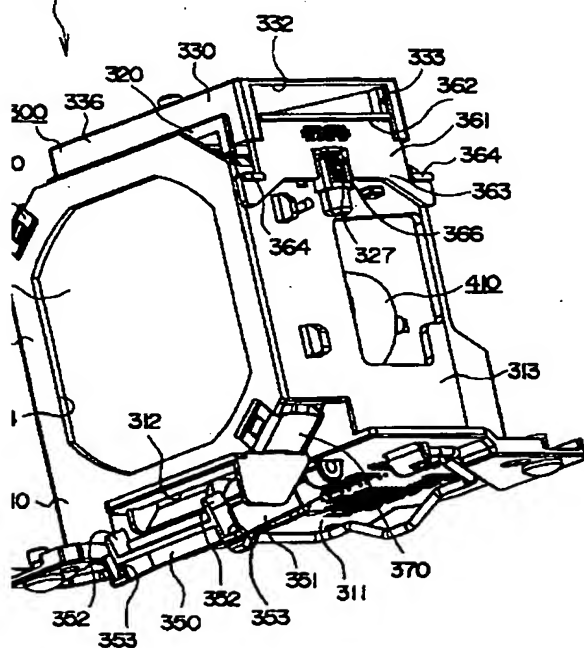


Figure 8]



awing 9]  
413



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awing_10]
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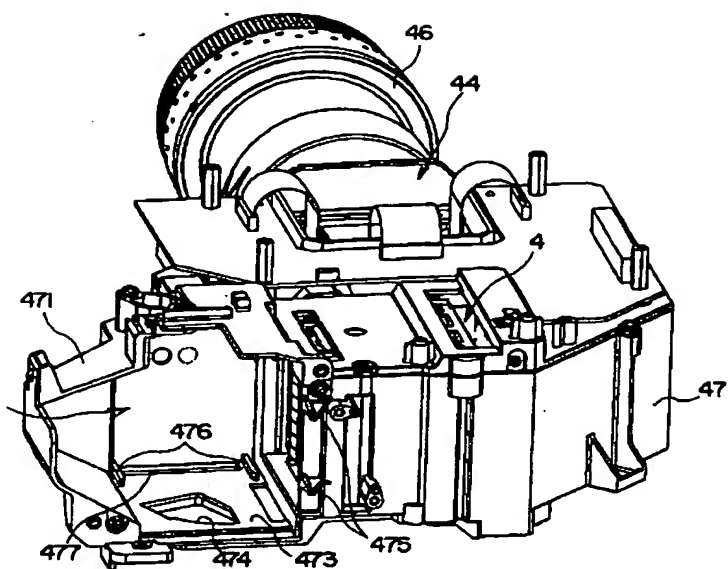


Figure 13

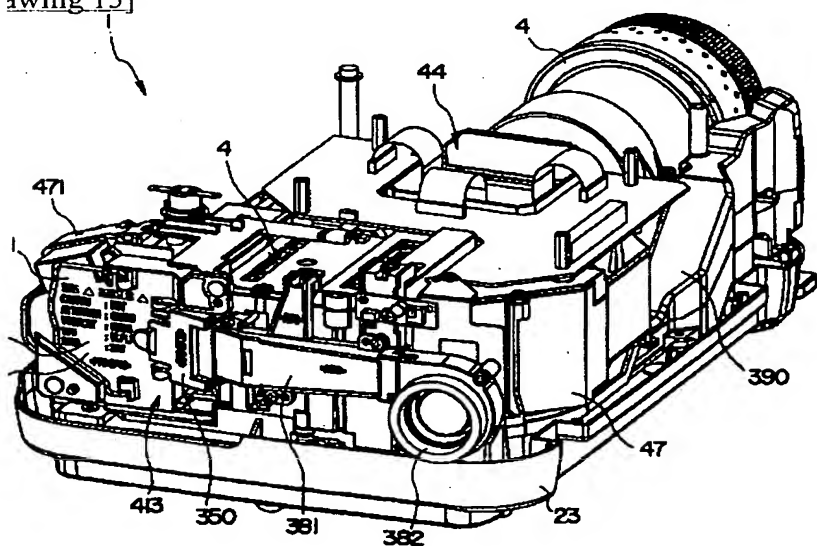
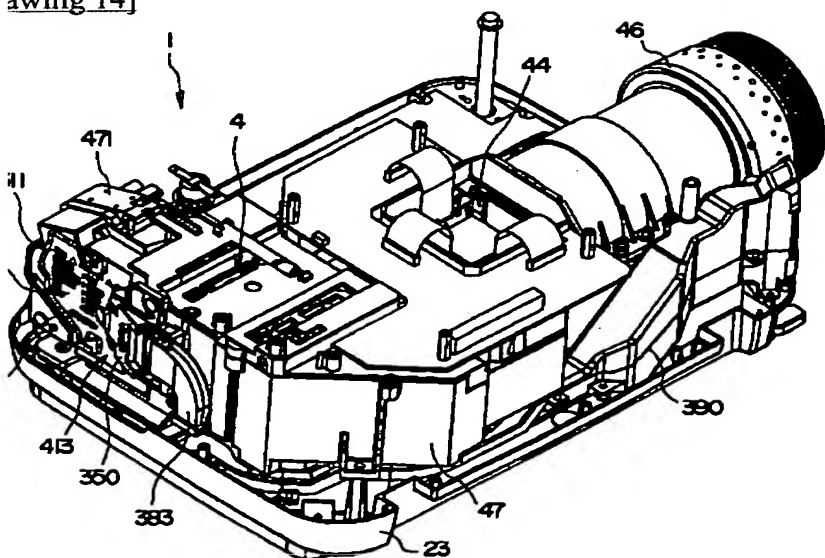


Figure 14



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